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# Knee Injuries, and How to Manage Them

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*of Philadelphia*



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## KNEE INJURIES, AND HOW TO MANAGE THEM.

BY

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Given a joint as large and complicated as the knee, with the liability to injuries varying in degree from a slight sprain or contusion up to that of a complete crush of the bones and joint; given also the mental attitude of the patient, varying all the way from that of the footballist who has been maltrained to believe that any acknowledgment of injury or pain is unmanly, to that of the hysterical girl injured in an accident and anxious to recover full damages from a railroad company; with such a variety of conditions the surgeon will encounter a problem that will tax his powers of diagnosis and treatment to the fullest exercise of judgment, discrimination and skill.

To extend this paper to the major injuries of fracture, dislocation, gunshot and other penetrating wounds of the knee-joint, would prolong the article indefinitely, hence I will endeavor to restrict its scope to the injuries which, though less destructive at the time, may be of longer continuance and perhaps of greater ultimate annoyance to the patient from weakness, disability and painfulness of the joint, together with frequent interruption to his normal vocation.

*Sprains with or without Laceration of Ligaments.*—Sprain of the knee occasioned either by twists or by a forcible bending of the knee in any abnormal direction may result simply in the stretching of the lateral ligaments, tendons or periarticular structures, or in partial or complete rupture, depending upon the direction, and the degree of effort exerted. The sharp pain occasioned at the time may temporarily pass away, especially under the excitement of the injury, even when considerable laceration has occurred, but subsequent use may develop an inflammation either about the joint or extending into it. This may or may not be followed by serous effusion. The question of diagnosis is an important one. The conditions most likely to be confounded with a lacera-

tion of ligaments are displacement of the semilunar cartilage and the slipping of a loose body in the joint; these accidents will be discussed later. A socalled sprain sometimes means extensive laceration of tissues, tearing up of periosteum and even fracture with fragments of bone in the joint, hence an X-ray shadow is desirable. For a sprain of moderate degree, I know of nothing so immediately helpful as the continuous application for an hour of hot water constantly applied at the highest temperature endurable to the skin, or of dry heat obtained by an electrically-heated pad. If the diagnosis is that of only a slight sprain, tight strapping of the entire joint with adhesive strips, after a slight period of rest, may permit the patient speedily to resume his occupation. If the injury is more severe and pain and effusion into the joint occur with swelling, the early application of ice-bags or of a rubber coil of ice water will often abort a threatened invasion of the joint. The joint should be put at once at rest with a gypsum or other rigid dressing, and rest in bed or on crutches enforced for at least a week. At the end of that time the cast may be removed, the joint moved slightly voluntarily and the cast slipped again over the knee. After daily treatments of this character for a week, the cast may be removed entirely and adhesive strips, or a flannel or rubber bandage applied. Both voluntary and passive motions should be instituted. Exercise in a well-equipped orthopedic gymnasium will be of the greatest service. Dry hot air is useful in producing absorption, as is also the therapeutic effect of the X-ray. The subsequent weakness of the joint is often due to undue mobility, caused by torn or lax ligaments. Slight effusion may be absorbed, but if the amount of fluid is large it should be removed by aseptic aspiration, or by free incision. If the quantity is large, there is much danger of permanent disability if the fluid is allowed to remain.

There should be no hesitancy about opening the knee-joint whenever it becomes necessary. Much of the timidity displayed by surgeons is the result of old methods which were necessarily dangerous. With rigid asepsis, the surgeon is as safe in exploring a knee-joint as he is in opening the peritoneal cavity.

*Contusions.*—Contusions of the knee are usually of lighter degree than sprains, and while synovitis with effusion or arthritis may follow, the general rule applicable to sprains will apply to injuries of this class.

*Displacement of Semilunar Cartilages.*—English writers have a rather peculiar designation, “internal derangement of the knee-joint,” which is capable of quite wide application. Its ordinary restriction, however, should be limited to displacement of the semilunar cartilage (Hey). If a semilunar cartilage is displaced, or a portion of it is broken off and slips back into place before it is seen by the surgeon, as is not infrequently the case, it is difficult to diagnose such an injury from the slipping of a loose cartilaginous body. When, however, the semilunars are loosened from their connections and are pushed in any direction, the clinical symptoms are sufficiently evident, unless the swelling is very great before the surgeon’s examination. The suddenness of the pain and deformity, the flexed position of the limb, the presence of a hard foreign body in the connective tissue, the locking of the joint and the inability to produce extension are marked symptoms. Some writers endeavor to make distinctions between the lawn tennis knee, the golfer’s knee, the football knee, etc., but while certain forms of injury are prone to occur in various athletic movements, yet the great multiplicity of movements and the variety of traumatic forces applied make it more judicious for the surgeon to consider each case carefully and to differentiate if possible the conditions of sprain, contusion, laceration of ligaments, displacement of cartilages, fracture, etc. It should always be remembered that the injury to the periarticular structures may be even more important than the joint injury.

A displaced semilunar cartilage can be reduced after anesthesia by making traction upon the lower leg to draw it away from the femur, then making pressure upon the displaced cartilage, the leg is strongly flexed and rotated, then quickly extended. Should this maneuver fail, the leg may be sharply flexed upon the thigh over the fist or arm of the surgeon, while with the other hand, manipulation of the lower leg is continued. The best position for this is with the patient lying upon his back upon the floor. Other surgeons seat the patient upon the edge of a table and flex the leg sharply underneath. If the displacement has occurred laterally, pressure and counterpressure must be made in accordance with this position. If the cartilage can be reduced, it is not wise at the first displacement to perform an open operation, since fixation and attachment of the cartilage may occur after reduction, provided thorough rest and protection are given to the joint for a time sufficient to

allow adhesions. The patient must use extreme care against violence, and particularly against undue flexion of the joint. It is well to wear for some months an apparatus which will not only limit the flexion and extension of the joint, but will also protect it from secondary traumatisms. The constant reminder to the individual by such an apparatus is also helpful, and especially in the case of an active boy the restriction of movement will be of much use. Two lateral steel uprights with stop-joint at the knee may be attached to a sole plate worn inside the shoe. Leather or felt casings, with or without joints, while sometimes necessary, are harmful by their interference with circulation. Should slipping recur, the joint should be freely opened, especially in young or middle-aged patients, and the cartilage stitched in place around its circumferential border with chromicized gut or kangaroo tendon; if the cartilage shows signs of disease or of degeneration, it should be removed; if the fragment is small, it should also be removed. It should be remembered that these cartilages are of low vitality, but that they are the natural cushions of the knee. The surgeon can never be too careful in opening a knee-joint that his asepsis is complete. After the open operation the joint should be fixed for about two weeks by plaster-of-paris or other rigid splint. After that, slight voluntary motions should be permitted, followed later by involuntary passive movements and by massage, either manual or mechanical, or gymnastics; a well-equipped orthopedic gymnasium adds much to the rapid improvement of the patient. If the patient will sit upon the edge of a table or high chair and swing the leg to and fro, he will accomplish much. This movement can be increased by adding a weight or pendulum attachment to the foot. Protection by mechanical means of a brace is best. A bandage, or rubber, or laced knee-cap interferes with the circulation, and does not give much practical support. For the removal of induration and of effusion, an application of imbricated adhesive strips over the entire joint is of value. The pressure of a wet, flat sponge, bound in position, also assists in absorption.

Blisters, iodin, iodovaseline are of service. Ichthyl ointment is vile and smeary. Alternate hot and cold water douchings are especially useful, if followed by massage and manipulations.

For fixing the joint, next to absolute rest in bed, there is no application so convenient as that of plaster-of-

paris. The denunciation of plaster-of-paris in knee as in other surgery, comes from those who do not understand its use, or who apply it improperly. An expert in gypsum can use it largely in surgery and with the greatest advantage. It applies itself evenly to the surface, giving pressure upon no single point, but extending over a large area. It is cheap, easily applied, easily removed (provided section is made upon an inserted zinc strip before it is thoroughly hardened); can be loosened or tightened to accommodate itself to any amount of swelling, and is invaluable in cases in which it is necessary to prevent interference to treatment by the patient. Binder's board, wood, felt and other substances are effective, but are by no means as convenient. If one has the time to give to the work, silicate of soda or starch bandages are lighter, but in no other way superior.

Immobilization of a healthy joint will not cause ankylosis. It is the disease which produces the stiffening, and as motion is a normal function of the joint, one should use the greatest discrimination in regard to the time in which an inflamed or diseased joint is kept at rest. Of course in tuberculous joints, ankylosis is often the result desired when the process is thoroughly advanced, but traumatic joints are in an entirely different category.

Massage after sprains or contusions or dislocations, is certainly a most valuable measure. It is difficult to lay down laws as to the time when it should be commenced, or when passive motion should be instituted. In general, it may be stated that the sooner it can be applied without producing discomfort or increase of inflammation, the better. There is no other rule that will apply better than this. If inflammatory symptoms are awakened or pain increased, one must go more slowly. Dry, hot air is helpful also in promoting absorption.

It is of the utmost importance that the muscles be strengthened in order to prevent semilunar displacement, since lax ligaments are a common cause. Persistent weakness is due to abnormal mobility. The "slipping joint" is due to lax ligaments and feeble muscular stability. The creaking joint is usually due to deposits or to a relaxed joint.

The restoration of function after an injury of the knee is one of the most important elements in the treatment. Many knees are permanently stiffened by the want of proper primary and secondary management.

Ankylosis is often the result of permitting serous or

blood effusions, or purulent collections to remain until the joint functions have been obliterated. All this could have been prevented by early removal. Of course in severe injuries of the joint, motion may be blocked by bony fragments. By the use of the skiagraph these can be readily detected and should be removed if they prevent motion.

For the ankylosis following injury and inflammation of the knee-joint, massage and active and passive movements are necessary. If the bands are fibrous and for the relief of the stiffness in tendons and periarticular structures following inflammation, forcible movements under anesthesia may be employed judiciously by a surgeon and will be helpful. It is never wise to carry the movements to an extreme degree at the first effort. I have elsewhere given my views as to the extent and persistence of these movements.<sup>1</sup>

*Loose Bodies.*—Loose bodies in the joint may be either cartilaginous, calcareous, fatty, fibrinous, or ossific. They may be free in the joint, or may still remain attached to the synovial fringe by a slender elongated filament. While they remain external to the two opposing joint surfaces they may give little or no trouble, but when caught between the femur and tibia the sudden locking of the joint and the sharp pain is often sufficient to throw the patient to the ground or cause him to faint; sometimes the joint remains in the flexed position; more frequently a little manipulation of the leg allows the body to slide out and the knee can be again straightened; the consequent traumatism of the synovial lining may be slight, or it may be so severe as to cause much effusion of serum into the joint and into the bursa above the patella. The joint should be placed absolutely at rest in bed until the acute pain has passed, together with local anodyne applications and a plaster cast or other splint. Crutches and adhesive plaster strapping with slight motion should be allowed at the end of a week. Repetitions of the accident may be frequent, or a body may hide itself so that a long time will elapse before the bones are placed in such position as to allow it to fall between the surfaces. The Germans very aptly call these bodies "joint mice." It is not wise to operate upon the joint while in the acute stage. The interval operation is a safer one if thorough asepsis is insured. As the patient frequently acquires great dexterity in discovering the loose body and in extricating it from the joint surfaces,

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<sup>1</sup> Knee Ankylosis, Pennsylvania Medical Journal, January, 1905.

local anesthesia is preferable. The method of fixing the body by a pin and then giving ether is much more effective in theory than in practice. Spinal anesthesia is too risky an operation to add its dangers to that of opening the joint. An incision should be made directly over the body; if others are suspected, the bare finger should never be inserted into the joint, but a thoroughly sterile rubber glove should be employed. Hemorrhage should be controlled before the closure of the capsule with a silk or fine chromicized gut ligature; the skin wound should be closed without drainage and the joint placed at rest in plaster-of-paris or other splint for a week; after which voluntary motion should first be permitted, after that increasing passive motion; employment of crutches for one or two weeks, after which locomotion should be encouraged. When thickened synovial fringes are found, the opening should be made upon both sides of the joint so as to trim away all indurated portions. The wounded synovial membrane need not be sutured, but all hemorrhage should be controlled by hot applications before closure of the capsule. I once had quite a large hemorrhage in a case of this character, which required reopening of the joint. If there is any suspicion of degeneration of the fringes, a section should be reserved for microscopic study. I have had patients who have been upon crutches a year relieved in ten minutes by the removal of such a small floating body.

*Sensitive Joints, Often Called Hysteric.*—Under this head will be found many cases of results following moderate traumatism in neurotic individuals, or in fact in any individual who has been long subjected to rest after an accident. There is always a proper period of rest for inflamed tissues, but there is always a time for movement. The wisest and most successful surgeon is he who is able to diagnose the proper period when motion is to be substituted for rest and the extent to which it should be carried. A careful consideration of all the presenting clinical symptoms is essential. In many of these cases hypersensitiveness is the rule; the patient will scream with pain almost before the joint is touched. I do not mean that this is necessarily deception. Nervous, hysterical people are not always deceptive, but they have acquired the habit of pain; they deceive themselves. In fact, few individuals can bear care and nursing and sympathy without acquiring an undue and exaggerated idea of their sufferings. An amount of pain that would be scarcely recognized in the normal

state becomes under these circumstances of extreme importance and many joints are nursed for months and years after they should be performing their proper functions. "Ankylophobia" is an excellent name for this condition. It should be remembered always that the normal function of a joint is motion, that as speedily as possible after the subsidence of the acute inflammatory stage, this condition should be instituted, but too vigorous motion will simply retard the cure. Those who commence massage early and institute it properly are the most successful.

A practised surgeon does not even require the evidence of the X-ray to decide that a sensitive joint such as I have described, which shows no evidence of degeneration or induration after months of disuse, is a knee demanding firm, calm management of the mental condition of the patient, coupled with gradually increasing voluntary and involuntary movements of the joint. The treatment may well be commenced with etherization and moderate forcible movements, followed by massage and the various maneuvers already described. Judicious treatment will save these patients from years on crutches or rolling chairs, from which they may be "miraculously rescued" by Christian scientists or osteopaths.

When there is tuberculous degeneration and destruction, of course the whole condition is a different one and must be carefully diagnosed and cautiously treated. Tuberculous invasion should always be suspected in children, but is much less common in adults. In fact, the whole course of treatment will depend upon the accurate diagnosis of the condition.

*Blood Clots in the Joint.*—A violent contusion of the joint or other injury may be followed by a large effusion of blood. Sometimes this takes place slowly, and is not painful. It is best removed by the local application of ice, with a posterior splint and complete rest. If a diagnosis is well established, by the symptoms, the X-ray and the aspirator, it is wiser to open the joint and get rid of all the blood and the clots, since even if absorbed, more or less ankylosis is liable to result. Of course, the removal should be done under the most careful asepsis. The joint should be irrigated; a clean gloved finger introduced to remove clots and the joint drained with gauze. The drain may be removed on the fourth day and the wound stitched two or three days later, after which the joint may be carefully moved vol-

untarily. The sutures may come out by the end of the second week, and the patient should be encouraged to use the joint in walking in the fourth week. If the patient is not in good condition, there is great danger of this blood becoming infected if it is not removed.

*Synovitic Effusions.*—A large flat sponge or elastic bandage, or strapping, may assist in the absorption of the effusion, or an aspirator will remove hydrops, but when it is large and continuous, it is wiser to make an opening under thorough asepsis and to drain the joint with gauze. If this is not done, it often means many months of disability, which will be a very serious matter to a bread-winner. If the effusion becomes infected and purulent, of course free opening, irrigation and drainage, must be instituted at once. This is the only reasonable treatment for septic or gonorrhreal arthritis. In acutely septic cases, one should seldom trust to lateral incisions, but should lay the joint freely open by a semicircular incision, so as thoroughly to reach every portion of the joint with formalin solution. The joint in these cases is wisely left exposed if the constitutional symptoms are great, since the saving of the life of the individual is first to be considered.

#### CONCLUSIONS.

1. Apparently slight injuries of the knee often prove more lasting and annoying than those of a more positive nature, as fracture or dislocation.
2. Every injury of the knee should receive careful examination, since laceration of ligaments or of periar-ticular tissues, or displacement of semilunar cartilages, or of loose bodies, may have occurred. Obscure fractures, also, are not uncommon.
3. Every injured knee requires rest during its acute inflammatory stage; rest in bed, fixed dressings, and crutches are needful. Heat and cold are two powerful agents in aborting a threatened inflammation.
4. Adhesive plaster strapping is of great value in securing partial restraint of a knee and in producing absorption of effusion. Restricting apparatus should be used with discrimination.
5. Blood clots in the joints should be removed by incision and flushings.
6. Effusions, if large, should be removed by aspiration, or incision followed by weak iodin injection.
7. Displaced semilunar cartilages should be stitched

in position, or removed. Loose cartilaginous bodies should be removed.

8. Motion is the normal condition of joints, consequently massage and voluntary motions should be instituted as soon as the inflammatory stage has passed. Neglect of this precaution may result in a neuromimetic patient and a chronic cripple.

9. Sensitive neurotic knees should not be mistaken for diseased ones.

10. Complete primary rest during the inflammatory stage, followed by massage, voluntary and involuntary movements, gymnastic exercises, hot-air treatment, hot and cold douchings, etc., are the best means at our command for preventing ankylosis.

11. Should ankylosis follow, forcible straightenings, tenotomies, osteotomies, etc., may be required.



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